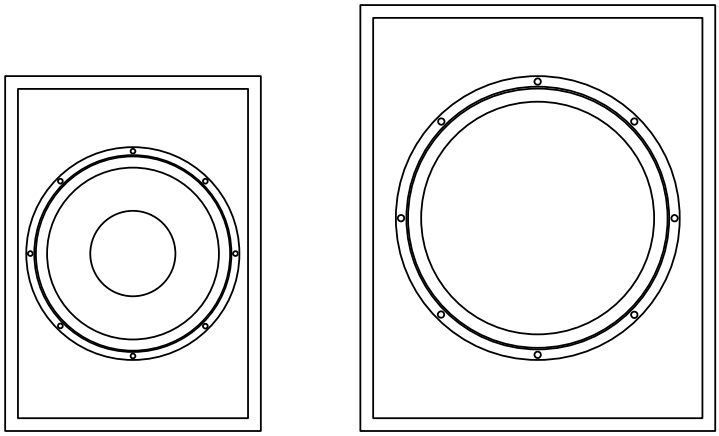
FAR Active Monitor by ATD²

PROFESSIONAL AUDIO MONITORING



SUB12.D – SUB15.D

USER MANUAL

ATD² (Audio Technology Design & Distribution)
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REVISION HISTORY

Date	Version	Author	Change
2006-12-12	1.0	X. Lambrecht	Initial revision
2008-12-18	1.1	X. Lambrecht	Added Polarity and Phase in the SUB menu

PRODUCT COMPLIANCE

The SUB15.D subwoofer complies with the following specifications:

- **EN 55103-1**: Product family standard for audio, video, audio-visual and entertainment apparatus for professional use – Part 1: Emission
- **EN 55103-2**: Product family standard for audio, video, audio-visual and entertainment apparatus for professional use – Part 2: Immunity
- **EN 55022**: Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement (Class B)
- **EN 55013**: Sound and television broadcast receivers and associated equipment. Radio disturbance characteristics. Limits and methods of measurement
- **EN 60065**: Safety requirements for main operated electronics and related apparatus for household and similar general use.
- **89/336/EEC** European Directive on electromagnetic compatibility (harmonized standard)

SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10. Only use attachments/accessories specified by the manufacturer.
11. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Warning!

- To reduce the risk of fire or electrical shock, do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as coffee cups, are placed on the equipment.
- Use a three wire grounding type line cord like the one supplied with the product.
- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- To completely disconnect from AC mains, disconnect the power supply cord from the AC receptacle.
- The mains plug of the power supply shall remain readily operable.
- Do not install in a confined space.
- Do not open the unit - risk of electric shock inside.

Service

There are no user-serviceable parts inside. All service must be performed by qualified personnel.

1 INTRODUCTION

1.1 This Manual

The latest manual revision is always available for download from www.atd2.com. Please compare to the revision number of the manual (see page 4) available for download from our web-site and download if newer. The present document will describe how to connect and setup a speaker system.

1.2 The Product Concept

The FAR Active monitor systems take a quantum leap forward in near-field / mid-field monitoring and **ATD²** is very proud to present these systems. The SUB15.D includes high quality analogue Class D amplification with the addition of powerful DSPs and CPU. New possibilities are opened for easy, convenient and central control of both audio and setup-info via dedicated PC software and remote control. The networking possibilities will fit nicely into today's applications and can be taken far into the future studio.

The SUB15.D is a Pro Audio near-field / mid-field subwoofer and is excellent for stereo and surround setups in applications such as Music Recording/Mixing, Post production, Film, Broadcast, Video-editing etc.
Unlike many rear or front-ported subwoofer that can be very unpractical to set up, the SUB15.D feature sealed box bass principle design that allows flush mounting, easy placement in the room and very accurate bass reproduction.

1.3 Digital Precision

The frequency response of the subwoofer of the subwoofer is controlled to a level of precision only practically obtainable with DSP.
All the filters available in the subwoofer are implemented in the digital domain. This guarantees a perfect repeatability from subwoofer to subwoofer. They will never vary with temperature, humidity and aging. It cannot be made more accurate and stable.

As most productions do end up in a digital format these days, the FAR Active monitors allow direct monitoring of the digital signal. Simply feed the monitors directly with an AES/EBU signal (IEC60958 compliant).
However, as many studios are today still working with analogue signals for monitoring, all the FAR Active monitors have, as standard feature, a very high quality analogue input.

2 PRODUCT DESCRIPTION

The subwoofer box is sealed (infinite baffle principle of work). There are no venting ports. This brings the following advantages:

- Flush mounting is possible (no rear port)
- No sensitivity to placement with respect to the rear wall (no rear port)
- No "out of phase" interferences between the woofer and a front port
- Cleaner and more accurate restitution in the bass frequencies

There is no such a concept of Master and Slave monitors. All FAR Active monitors have the same capabilities and features. There are also no special requirements on power ON and OFF sequences of the monitors. The subwoofers were designed to be "clicks and plops" free, in any conditions.

The following figure describes the subwoofer synoptic.

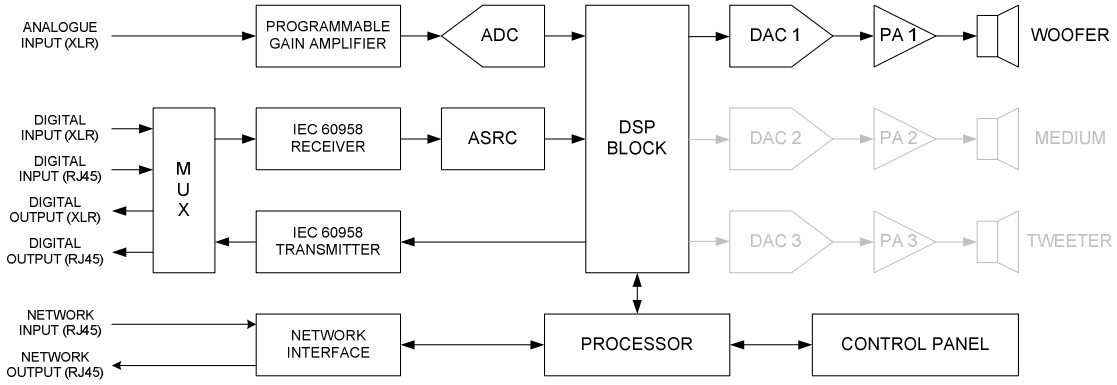


Figure 1: Subwoofer Synoptic

The signal processing can be subdivided in multiple functional blocks, as described in the next figure.

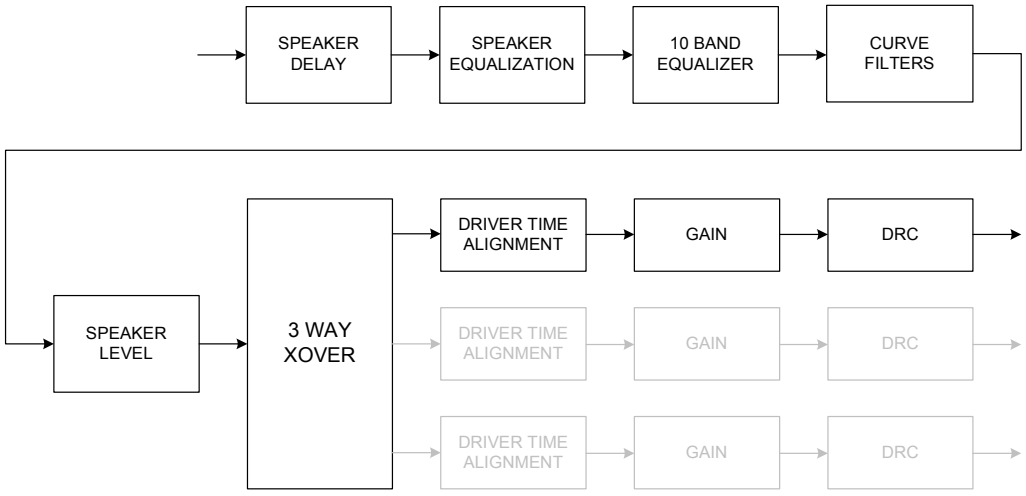


Figure 2: Subwoofer DSP Functional blocks

3 SUBWOOFER SETUP

All controls, display and connectors are located at the rear of the monitor with the exception of a front LED that indicates when the subwoofer is powered ON and that also signal with various types of blinking the network activity, amplifier limiter in service and hardware faults.

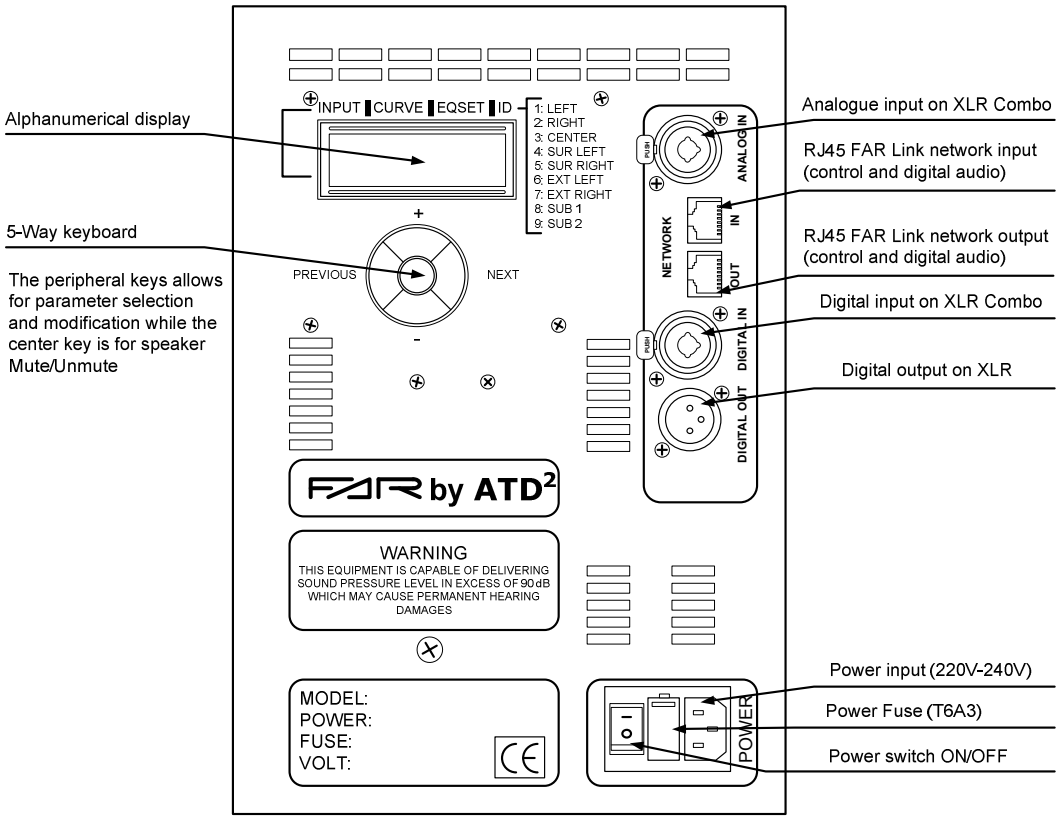


Figure 3: Monitor rear

3.1 Connectivity

The subwoofer provides the following connectors:

- XLR Analogue balanced input
- RJ45 FAR Link Network input
- RJ45 FAR Link Network output
- XLR AES/EBU digital input
- XLR AES/EBU digital output

The power input is an IEC connector.

3.1.1 Analogue Input

The monitor has a balanced analogue input on a XLR combo plug. The full scale sensitivity of the analogue input is selectable via the monitor control menu. It can be set to +3 dBu, +9 dBu, +15 dBu, +21 dBu and +24 dBu.
The standard broadcast full scale input level is +6 dBu with 9 dB headroom. In this case, the full scale input shall be set to +15 dBu.
The analogue signal is converted to the digital domain by a very high-end converter (96kHz – 24 bits). It is then treated as the other digital audio streams that can be fed to the monitor.

3.1.2 AES/EBU Input

The monitor has a balanced AES/EBU input on a XLR combo plug. The AES/EBU input is selectable via the monitor control menu. The AES/EBU input complies with the IEC 60958 standard. 2 audio channels are carried over an IEC60958 stream. The desired channel is selectable via the monitor control menu.

3.1.3 AES/EBU Output

The monitor has a balanced AES/EBU output on a XLR plug. The AES/EBU output content is selectable via the monitor control menu. The AES/EBU output complies with the IEC 60958 standard.
The typical use of the AES/EBU output is a signal loop-through to feed other monitors with the same signal.

3.1.4 FAR Link Network

The FAR Link network allows for streaming of monitor control messages and a pair of digital audio channels compliant with IEC60958 (AES/EBU like but on another medium).

3.1.4.1 Control Channel

The control channel allows the exchange of messages and data between the monitors and/or the remote control devices (PC or dedicated remote control).

3.1.4.2 Digital audio input

The monitor can use a CAT5 cable on RJ45 FAR Link ™ network plug to receive a digital audio stream compliant with IEC60958. The Network digital audio input is selectable via the monitor control menu. 2 audio channels are carried over IEC60958. The desired channel is selectable via the monitor control menu.
The Network digital audio stream and the AES/EBU stream can run concurrently, making 4 digital audio channels simultaneously available to each monitor.

3.1.4.3 Digital audio output

The monitor can use a CTA5 cable on the RJ45 FAR Link ™ network plug to transmit a digital audio stream compliant with IEC60958. The Network digital audio output content is selectable via the monitor control menu.

3.2 Operation Overview

The control panel at the subwoofer rear gives access to the basic configuration parameters of the monitor. The menu items can be selected (displayed on the alphanumerical screen) using the left and right keys (PREVIOUS / NEXT) while the parameter value is changed using the up and down keys (+ / -).
The alphanumerical LCD displays the information on 2 lines. The first line shows the selected parameter and its value. The second line gives the subwoofer status.

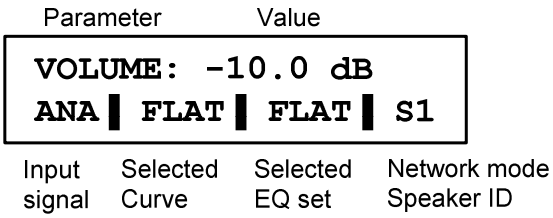


Figure 4: Display layout

The input signal field indicates the signal currently used by the monitor. When the central button is pushed, the monitor is muted and the field shows "Mut". In nominal operation, the field can get the following values:

- **ANA** to indicate that the analogue input is active
- **AES** to indicate that the AES/EBU input is selected

- **NET** to indicate that the FAR Link network is the signal source

The following picture shows the various subwoofer parameters accessible via the control panel and their associated value range.

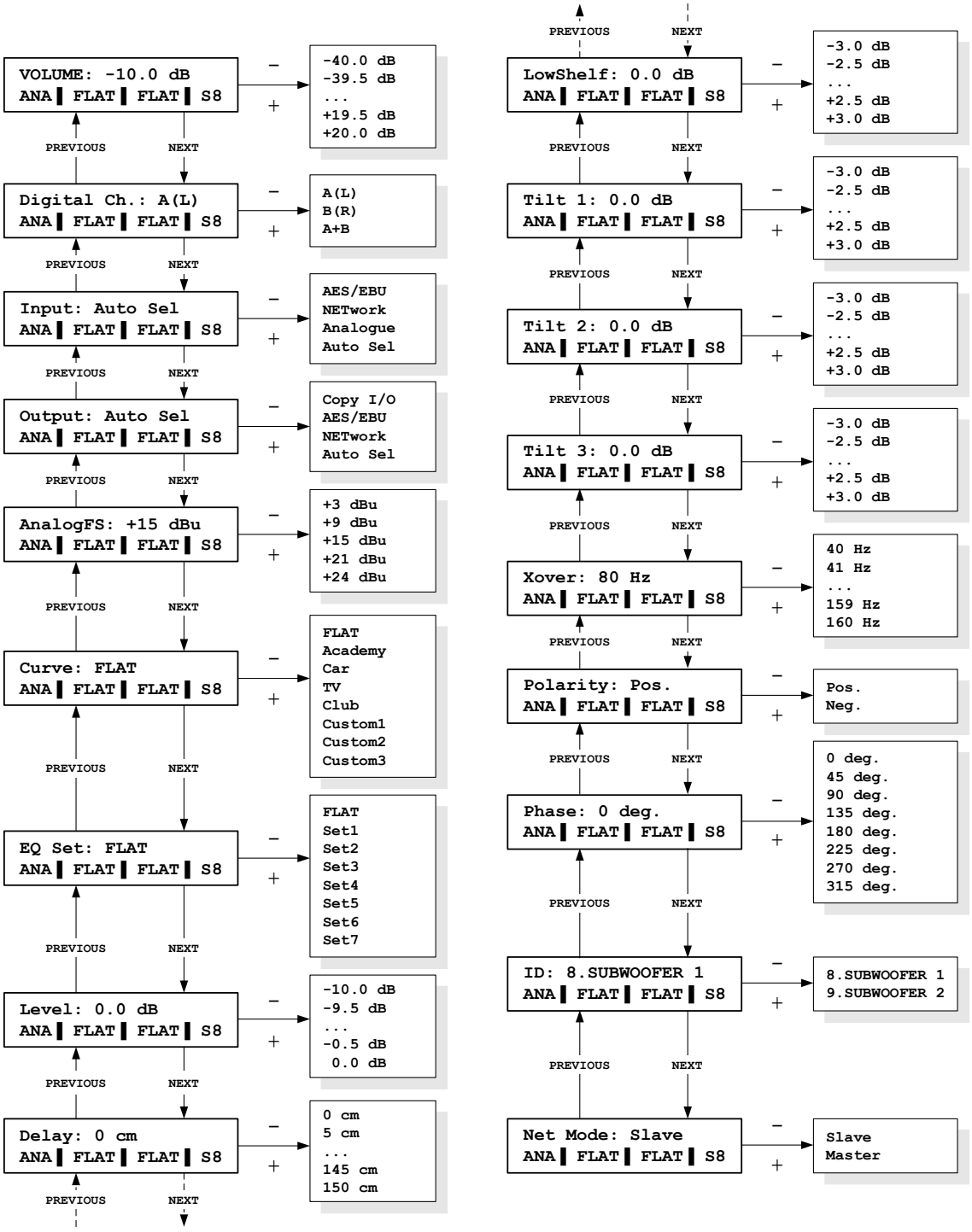


Figure 5: SUB Setup Parameter Overview

3.3 Parameter definition

3.3.1 Subwoofer Volume

The subwoofer volume is the first menu item. It can range from -40dB to +20 dB by steps of 0.5 dB.

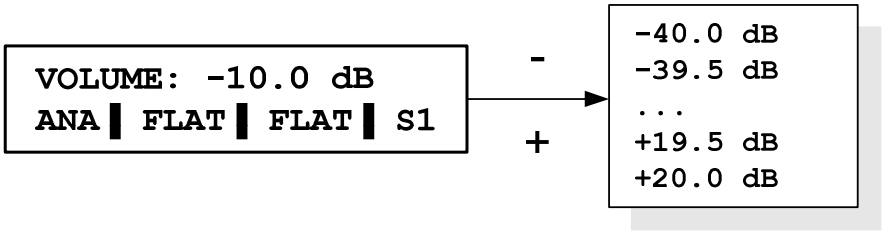


Figure 6: Volume parameter and values

3.3.2 Digital Channel Selection

The digital channel selector is the second menu item. It allows the user to select the first channel (A) or second channel (B) of a IEC60958 digital audio stream. In stereo applications, the left channel is mapped on the A channel and the right channel is mapped on the B channel. In multi-channel applications, three AES/EBU links are necessary. The channel mapping is usually defined as follow:

AES/EBU Link	Channel A	Channel B
Cable 1	Left	Right
Cable 2	Center	LFE
Cable 3	Surround left	Surround right

It is also possible to select the sum of the A and B channels (A+B). This is especially useful when having a stereo 2.1 configuration (2 speakers plus 1 subwoofer).

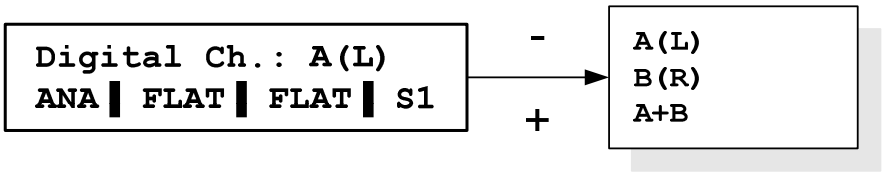


Figure 7: Digital channel selection parameter and possible values

3.3.3 Signal Input Selection

The input signal selector is the third menu item. It allows the user to select the input signal that the monitor will render. As the FAR Active monitor works with both analogue and digital signals, the user must set a preference. The "Auto Sel" option let the monitor decide on what to select by default. In this case, the monitor will look for a digital stream on the AES/EBU input or on the FAR Link network input. While scanning the digital inputs, the monitor render by default the analogue input. Once a digital stream compliant with IEC60958 is detected, the monitor switches to the active digital input and stays locked to it till the stream disappears.
The monitor input can also be forced to one of the three inputs.

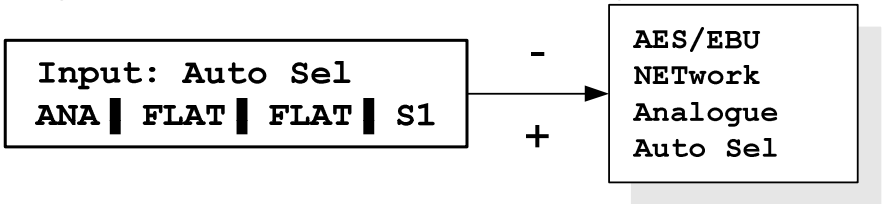


Figure 8: Input signal selection parameter and possible values

When the selected digital input does not receive a valid digital audio stream, the separation symbol of the second display line changes its form to an empty square frame instead of a plain square.

Figure 9: AES input with valid IEC60958 stream

Figure 10: AES input with invalid or not present signal

3.3.4 Digital Output Selection

The digital output signal selector is the forth menu item. It allows the user to select the digital output signal that the monitor will send on the AES/EBU output and the FAR Link network output. The monitor can route the digital input signals to the digital outputs in multiple ways (see section 3.4 for additional details).

Digital output	AES/EBU output	FAR Link network output
Copy I/O	AES/EBU input	FAR Link network input
AES/EBU	AES/EBU input	AES/EBU input
NETwork	FAR Link network input	FAR Link network input
Auto Sel	Active digital input	Active digital input

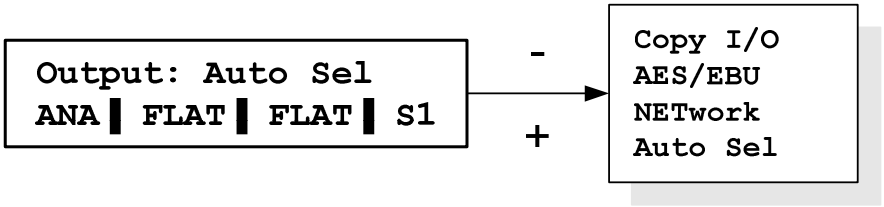


Figure 11: Digital output signal selection parameter and possible values

3.3.5 Analogue Full scale selection

The Analogue full scale selector is the 5th menu item. The balanced input full scale level can be set to +3 dBu, +9 dBu, +15 dBu, +21 dBu or +24 dBu. It is assumed that the signal is delivered in a symmetrical fashion to the subwoofer. If an asymmetrical signal or an unbalanced signal must be used, the effective full scale level will become the one displayed minus 6 dB.

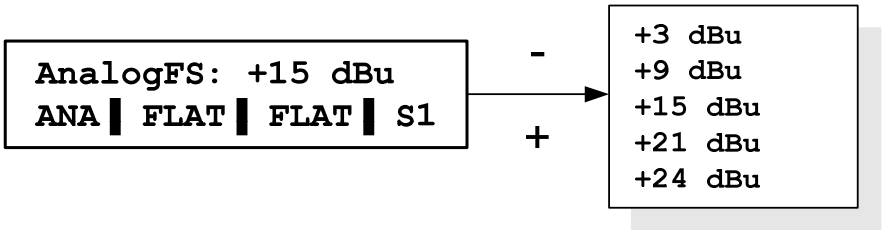


Figure 12: Analogue input full scale selection parameter and possible values

When the analogue input level exceeds the selected full scale level, the separation symbol of the second display line changes its form to an empty square frame instead of a plain square.

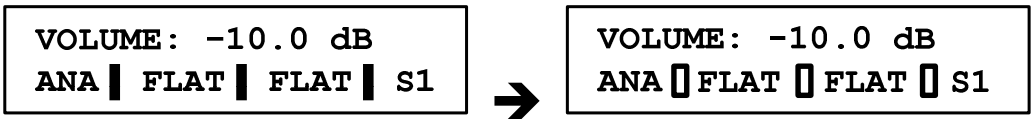


Figure 13: Display behavior when the analogue input level exceeds the selected full scale level

3.3.6 Curve selection

The Curve selector is the 6th menu item. The user can select a preset curve which will modify the frequency response of the monitor to emulate a given acoustical environment. There are 7 presets plus the FLAT reference. Each preset filters and name can be modified by the PC Speaker Control Software (SCS). The Curve selector does only recall the stored preset.

The factory settings of the monitor provide 4 defined curves by default (Academy, Car, TV, Club). The "Custom1", "Custom2" and "Custom3" curves are equivalent to the FLAT reference curve.

The 4 first letters of the name of the selected curve are permanently displayed on the second field of the bottom line of the LCD.

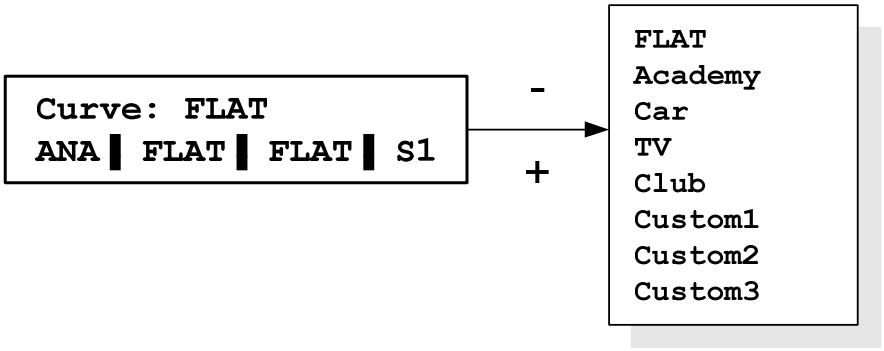
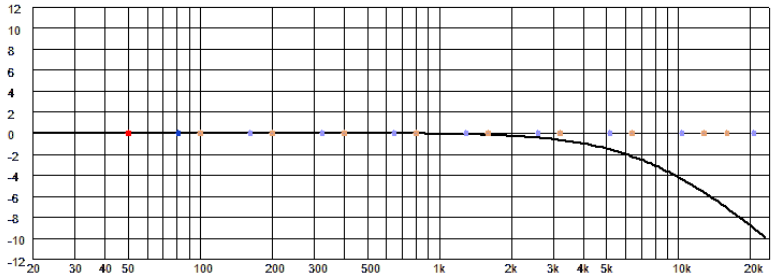
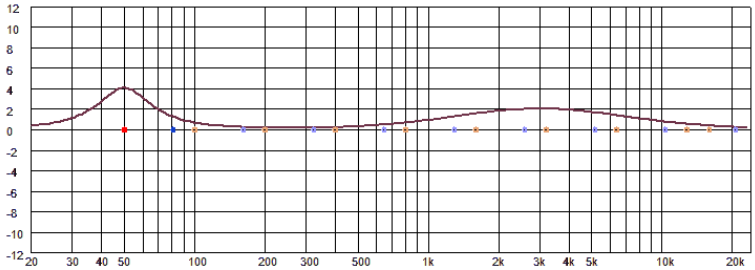


Figure 14: Curve selection parameter and possible values (factory default shown)

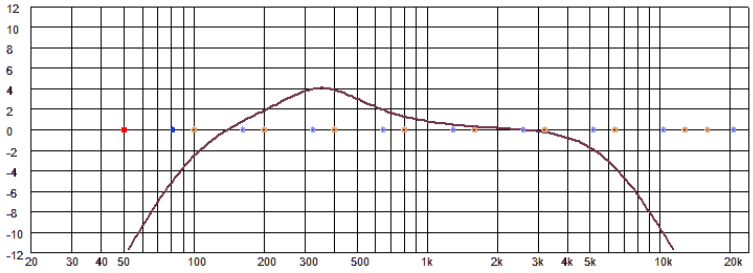
The curve "Academy" has a low pass filter of the first order (6 dB/Oct) at 8 kHz. It is meant to emulate the effect of a perforated cinema screen placed in front of the subwoofers.



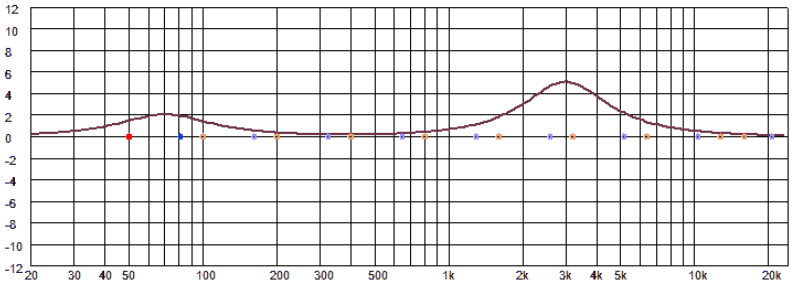
The curve CAR simulates the listening in a car environment. A 4 dB boost at 50 Hz and a 2 dB boost at 3 kHz.



The curve "TV" simulates the frequency response of a standard TV set.



The curve CLUB simulates the listening in a night club environment. A 2 dB boost at 60 Hz and a 5 dB boost at 3 kHz.



3.3.7 EQ Set selection

The EQ Set selector is the 7th menu item. The user can select an EQ Set which will modify the frequency response of the monitor to compensate for room acoustics effects. There are 7 QE Sets plus the FLAT reference. Each EQ set filters and name can be modified by the PC Speaker Control Software (SCS). The EQ Set selector does only recall the stored preset. The factory default for all the 7 EQ Sets is FLAT. The 4 first letters of the name of the selected EQ set are permanently displayed on the third field of the bottom line of the LCD.

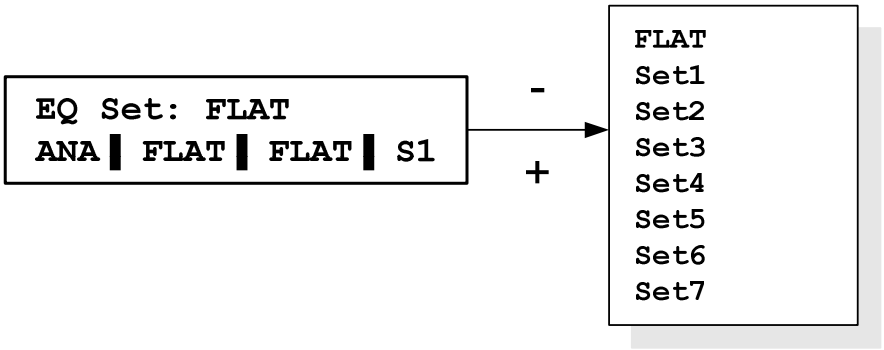


Figure 15: EQ Set selection parameter and possible values (factory default shown)

3.3.8 Subwoofer relative level

The subwoofer relative level is the 8th menu item. It can range from -10dB to 0 dB by steps of 0.5 dB. The subwoofer relative level is meant to balance the acoustic power between multiple speakers in a multi-channel system.

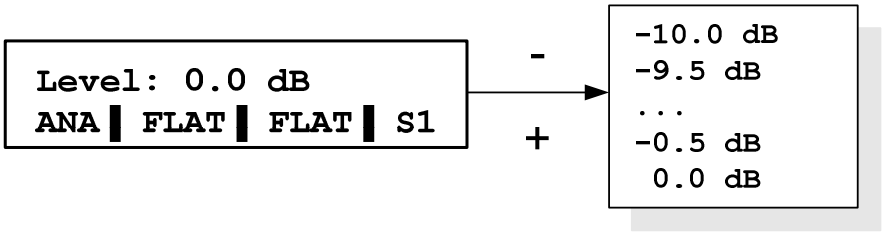


Figure 16: Relative subwoofer level parameter and values

3.3.9 Subwoofer relative delay

The subwoofer relative delay is the 9th menu item. It can range from 0 cm to 150 cm by steps of 5 cm. Speakers relative delay is meant to time align the speakers in a multi-channel system.

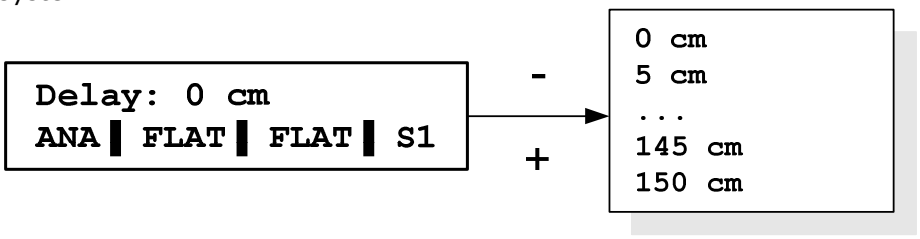


Figure 17: Relative subwoofer delay parameter and values

3.3.10 Shelf and Tilts

The subwoofer features a low shelf filter and 3 tilt filters (parametric EQ filters). The gain of these filters can be set from -3 dB to +3 dB by steps of 0.5 dB. The corner frequency and Q or S factor can be modified by the SCS.

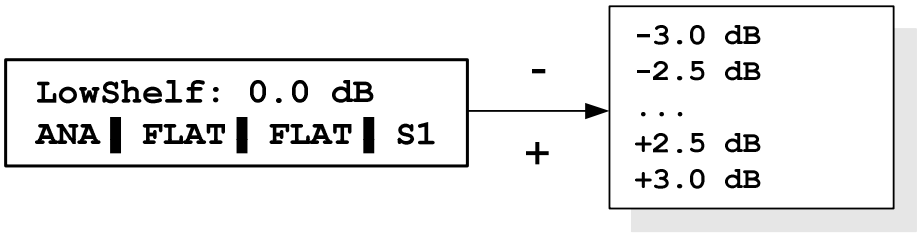


Figure 18: Low Shelf gain parameter and possible value

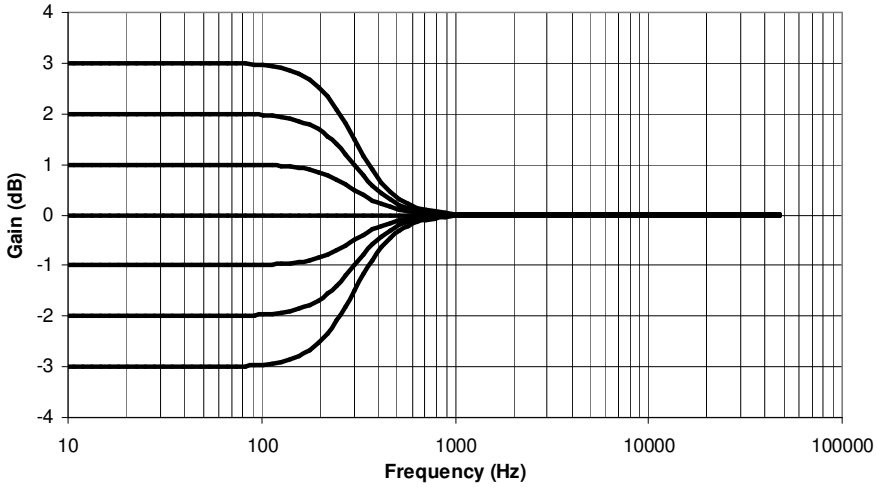


Figure 19: Low Shelf frequency response -3dB, -2dB, -1dB, 0dB, +1dB, +2dB and +3 dB gain (Frequency = 300 Hz and S = 1 are factory default)

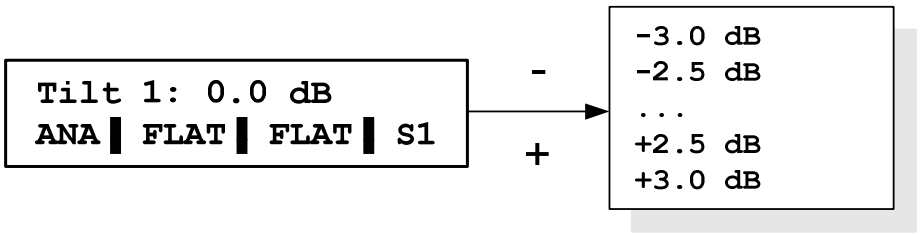


Figure 20: Tilt 1 gain parameter and possible value

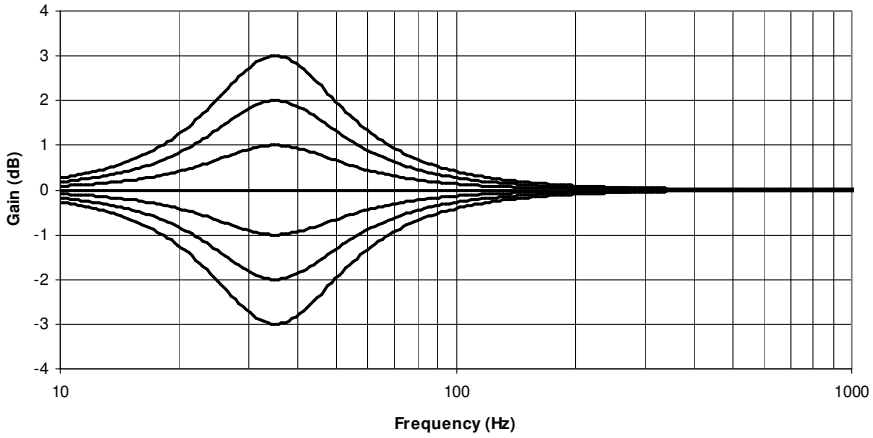


Figure 21: Tilt 1 frequency response for -3dB, -2dB, -1dB, 0dB, +1dB, +2dB and +3 dB gain (Frequency = 35 Hz and Q = 1 are factory default)

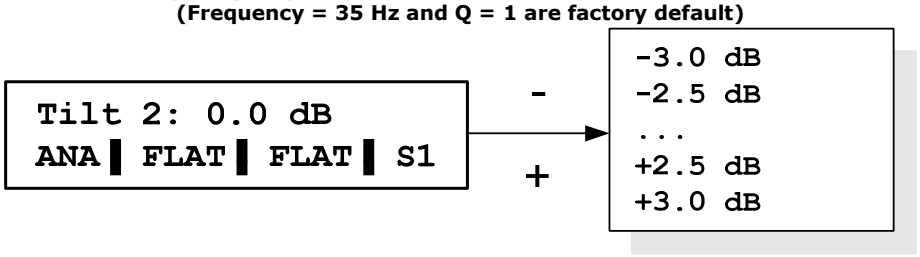


Figure 22: Tilt 2 gain parameter and possible value

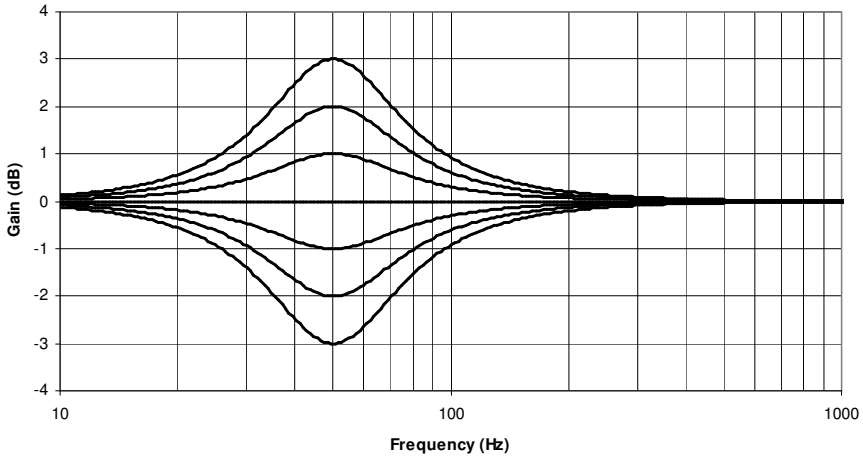


Figure 23: Tilt 2 frequency response for -3dB, -2dB, -1dB, 0dB, +1dB, +2dB and +3 dB gain (Frequency = 50 Hz and Q = 1 are factory default)

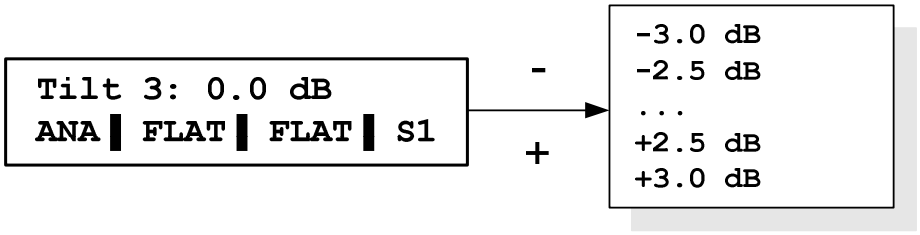


Figure 24: Tilt 3 gain parameter and possible value

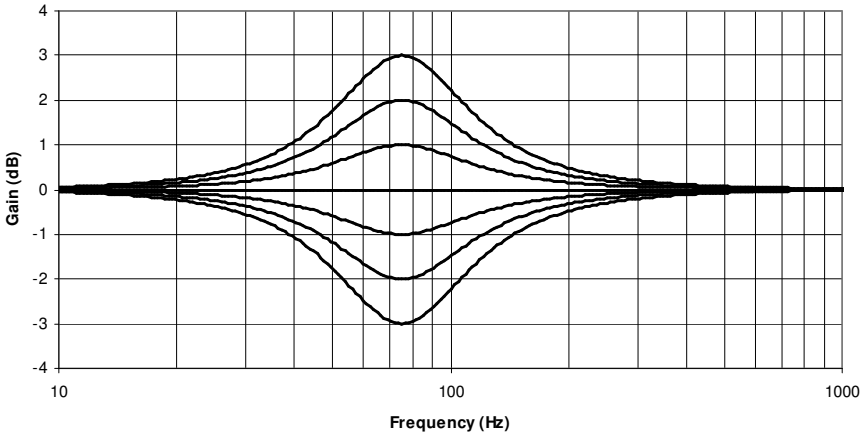


Figure 25: Tilt 3 frequency response for -3dB, -2dB, -1dB, 0dB, +1dB, +2dB and +3 dB gain values (Frequency = 75 Hz and Q = 1 are factory default)

3.3.11 Subwoofer cross-over frequency

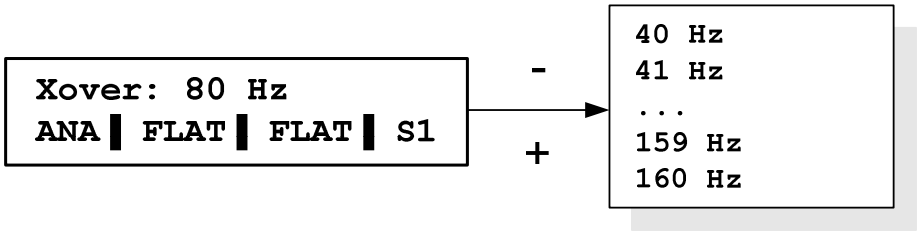


Figure 26: Cross-over frequency and possible values

The cross-over frequency is the 14th menu item. It sets the frequency of the 24 dB/octave low-pass filter of the subwoofer. The frequency can be set within 40 Hz and 160 Hz by step of 1 Hz. In a multi-channel setup, the cut-off frequency is often 80 Hz.

3.3.12 Subwoofer Polarity

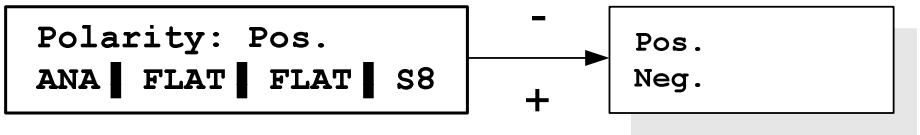


Figure 27: Signal polarity and possible values

The Polarity is the 15th menu item. It sets output signal polarity of the subwoofer. It can be set to "Pos.", which means untouched polarity or it can be set to "Neg.", which means reversed phase (negative signal over the whole frequency range).

3.3.13 Subwoofer Phase

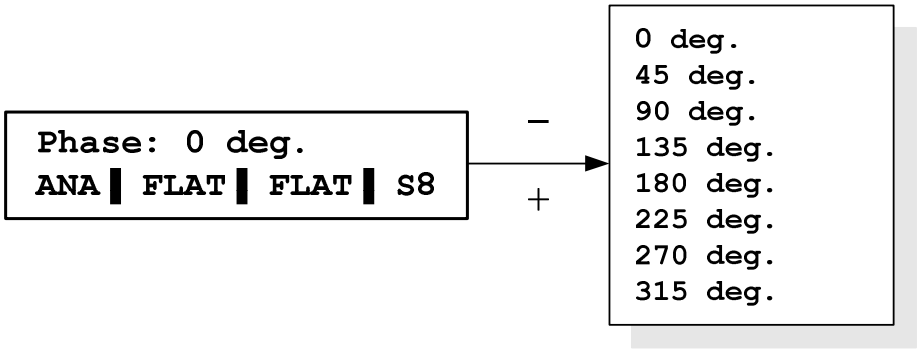


Figure 28: Cross-over Phase and possible values

The absolute phase is the 16th menu item. It defines the phase offset at the cross-over frequency. The phase offset is implemented by an all-pass filter of the second order. The value ***0 deg.*** disable the all-pass filter. The phase offset can be set from 0 to 315 deg. by step of 45 deg.

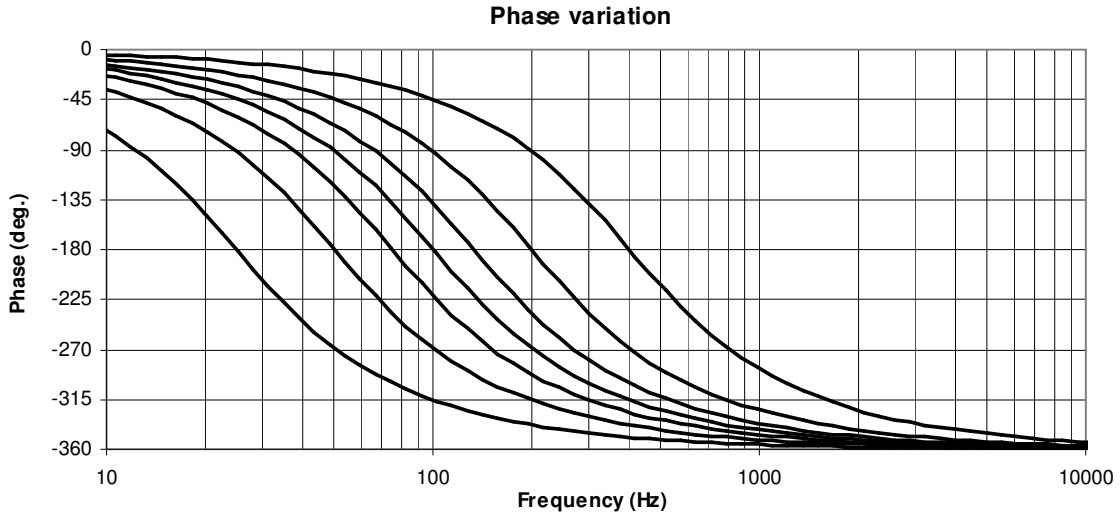


Figure 29: Phase response for a cross-over frequency of 100 Hz with 45°, 90°, 135°, 180°, 225°, 270° and 315° phase settings

3.3.14 Subwoofer ID

The sub ID is the 17th menu item. It sets the network address and defines the speaker role in the system. Up to 2 subwoofers can be used concurrently in a network. The sub ID is permanently displayed in the last field (right end) of the bottom line of the speaker LCD screen.

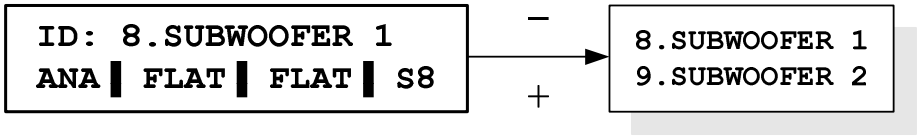


Figure 30: Speaker ID parameter and possible value

3.3.15 Network mode

The network mode is the 18th and last menu item. It defines the behavior of the subwoofer on the network.

In Slave mode, a change made on the subwoofer parameter via the subwoofer control panel is reflected on the network to allow the remote control or the SCS to keep updated on the speaker system configuration. The other speakers on the network will ignore these changes.

In Master mode, a change on a subwoofer parameter will be propagated on all the speakers present on the network. This mode allows one speaker to be used as a remote control. For instance, muting a speaker set in network master will mute all the speakers in the network. When a parameter shall be changed on only one sub, make sure that the sub is in network slave mode.

There can be multiple masters in a network. The network mode status is displayed on the bottom line of the screen. It is concatenated with the speaker ID. For instance, the speaker ID 8 in network slave mode will display a **S8**. The sub ID 9 in network master mode will display **M9**.

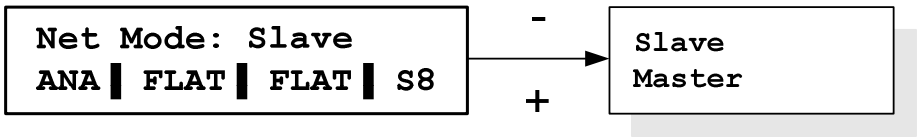


Figure 31: Network mode parameter and possible value

Not all the speaker parameters are allowed to be broadcasted. The following list gives the parameters that are affected by the network mode.

- Mute
- Speaker Volume
- Signal Input
- Digital output
- Analogue full scale
- Curve
- EQ set
- Low Shelf gain
- Low Tilt gain
- Mid Tilt gain
- High Tilt gain
- High Shelf gain

3.4 Network Operation

The FAR Active Monitors can be connected together via the FAR Link ™ network, using standard CAT5 cables (like the ones used in Ethernet **PATCH** connections).
WARNING: DO NOT USE ETHERNET CROSS CABLE. They will not work properly.
The network is optional in the use of the monitors. Its primary purpose is to control the speakers remotely, by using a dedicated remote control or the SCS ™ (Speaker Control Software) running on a Windows OS.

3.4.1 Control chaining constraints

When the network is used for control only, there are no constraints in the sequence of the speaker connection. The only important thing to verify is that the NETWORK OUT of a speaker is only connected to the NETWORK IN of another speaker.
WARNING: DO NOT CONNECT NETWORK OUT TO NETWORK OUT.
WARNING: DO NOT CONNECT NETWORK IN TO NETWORK IN.

3.4.2 Digital audio chaining constraints

Due to the signal bridging capabilities of the speakers, the digital audio stream does only propagate from the INPUT connector (whatever it is) to the OUTPUT connector (whatever it is). As a consequence, some sequences in the speaker network chaining will not allow the digital stream to reach its target. Careful attention shall be given to the system setup (see chapter 4 for more information).

The "Output" speaker parameter defines the signal routing. There are 3 possible configurations.

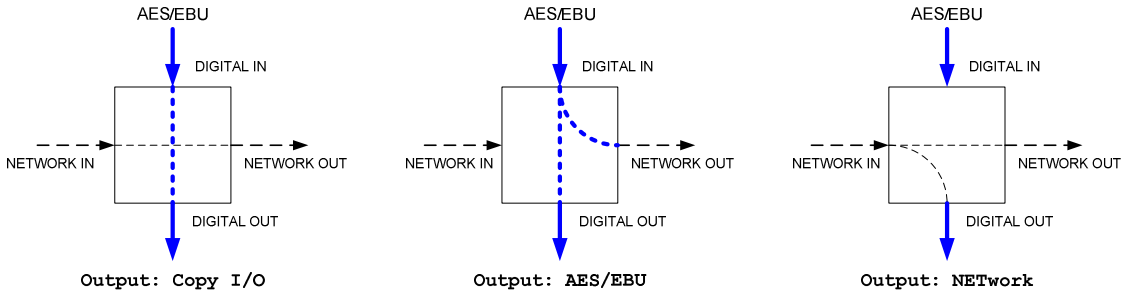


Figure 32: Digital signal routing

- "**Copy I/O**" does replicate on their respective digital outputs the content of the digital inputs
- "**AES/EBU**" does copy on the DIGITAL OUT and the NETWORK OUT the content of the DIGITAL IN
- "**NETwork**" does copy on the DIGITAL OUT and the NETWORK OUT the content of the NETWORK IN.

When the system is set to "**Auto Sel**", it selects either the "**AES/EBU**" mode or the "**NETwork**" mode, depending on the active input. If the active digital input is "**AES/EBU**", then the output will be "**AES/EBU**". If the active digital input is "**NETwork**", then the output will be "**NETwork**".

4 SYSTEM SETUP

In this chapter, the speaker will be represented by a box showing the speaker function with the required speaker parameter values and a box showing, for the same speaker, the digital signal routing.
For instance, the following speaker representation is the **LEFT** one in the system. It has its speaker ID configured with the value "**1.FRONT LEFT**", its input set to "**AES/EBU**", its digital output set to "**AES/EBU**" and its digital channel selection set to "**A(L)**" – left channel.

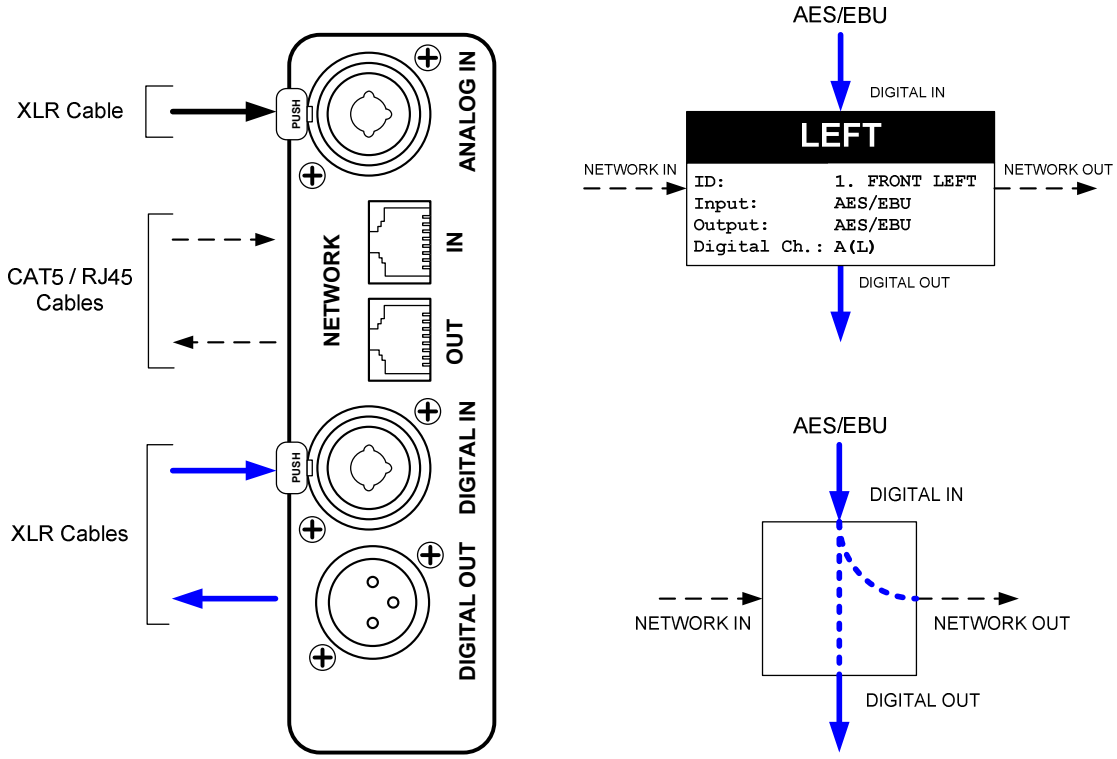
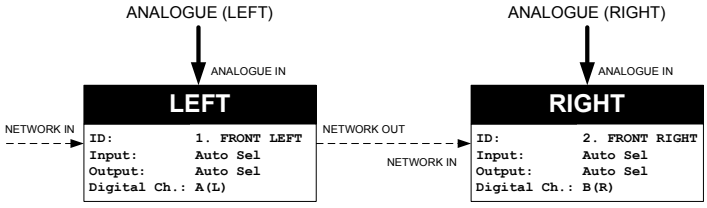


Figure 33: Speaker connectivity and cabling representation

4.1 Analogue Setup

4.1.1 Stereo System

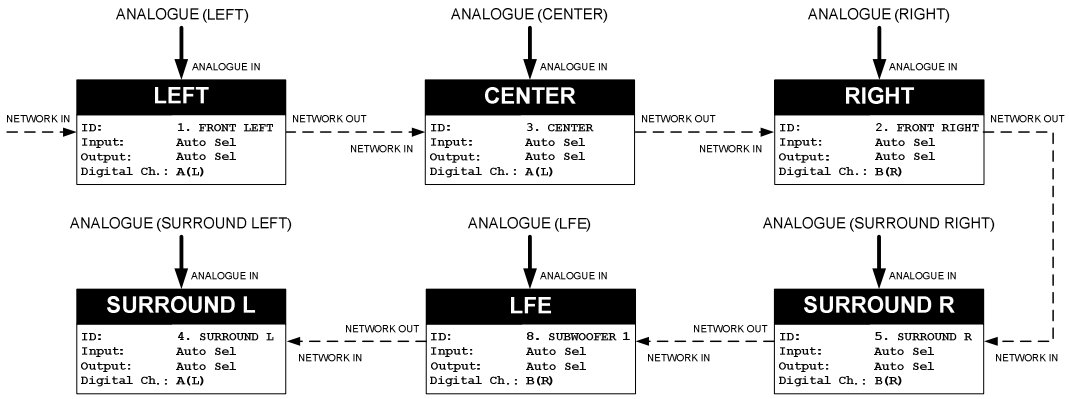
This is the easiest setup. The two speakers are fed with balanced analogue signals. Only the speaker analogue input is used. The network cable is optional and is only used for speaker control. If no remote control of the speakers is desired, the network inputs and outputs can be left unconnected.



4.1.2 Multi-channel 5.1 System

As for the stereo setup, an analogue 5.1 system is quite simple to install. The six speakers are fed with balanced analogue signals. Only the speaker analogue input is

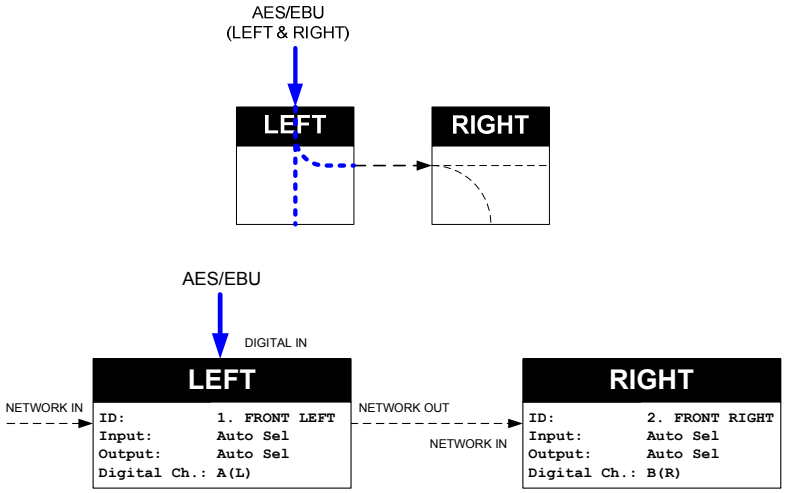
used. Once again the network cables are optional if no remote control is required. The sequence in which the speakers are linked with the network cable is not relevant for this application.



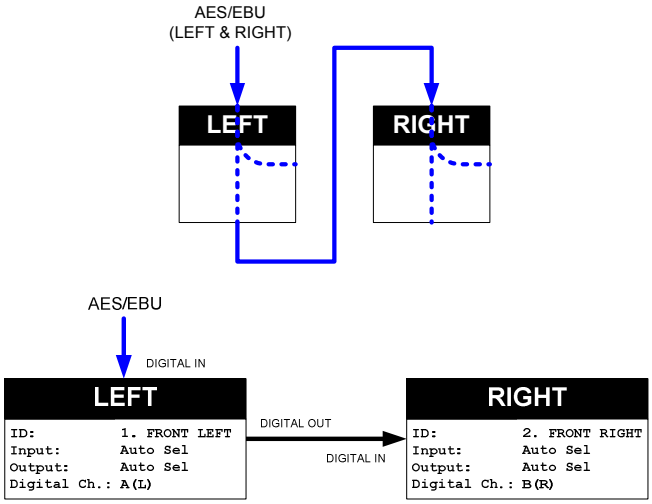
4.2 Digital setup

4.2.1 Stereo 2.0 System

There are 2 ways to setup a digital 2.0 system. The first one relies on the FAR Link ™ network to carry audio and control between the LEFT and the RIGHT speakers. The FAR Link ™ network cable is then the only link between the 2 speakers. The first speaker automatically bridge the AES/EBU input to the FAR Link ™ network output (Output "Auto Sel" setting)



The other option is to use the conventional XLR cables to link the speakers via the DIGITAL OUT / DIGITAL IN connectors. The first speaker automatically bridges the AES/EBU input to the AES/EBU output (Output "Auto Sel" setting) In this case, there will not be any remote control enabled.

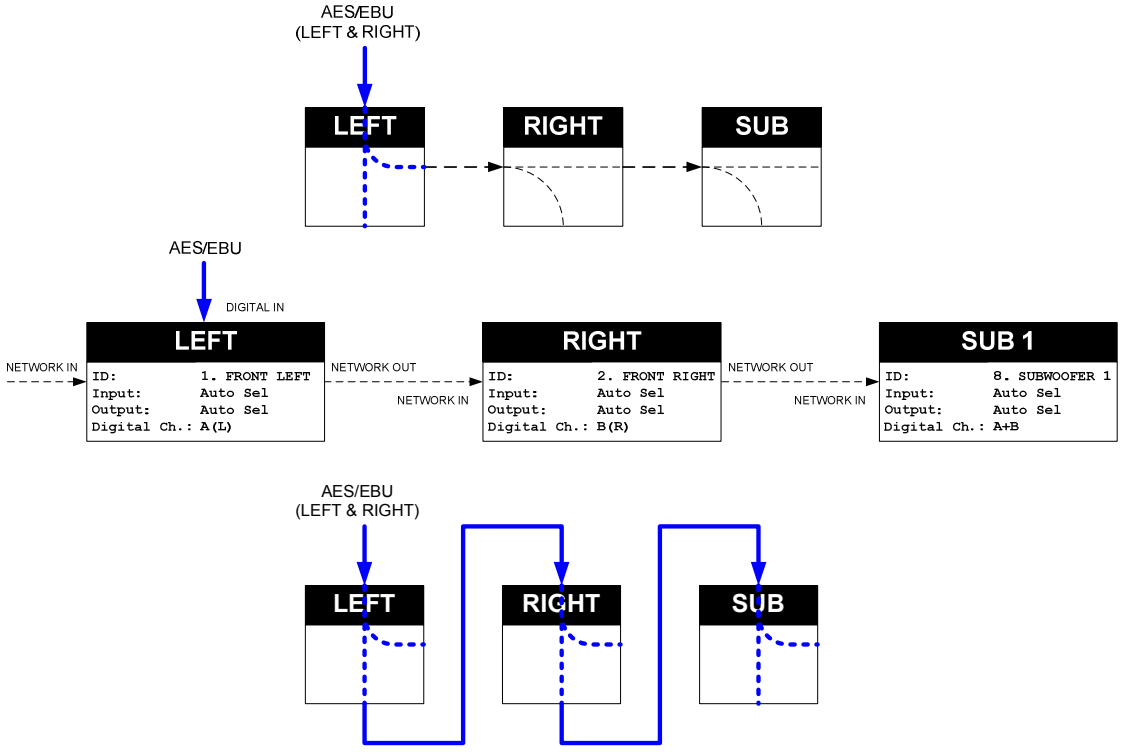


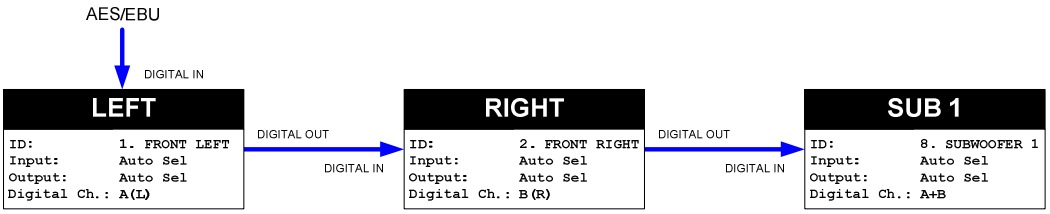
Note: It is not useful to have both the XLR cables and the network cable in place between two speakers. The quality of the digital audio link provided by the FAR Link ™ network is at least as good as the one of a classical AES/EBU output on XLR connector.

4.2.2 Stereo 2.1 System

A subwoofer can be used to improve the bass extension of a stereo system. The subwoofer will use the sum of the left and right channels present in the IEC60958 streams. The subwoofer digital channel selection shall be "**A+B**".

As for the classical stereo setup, the system can be cabled using the FAR Link ™ network or just the standard XLR cables.





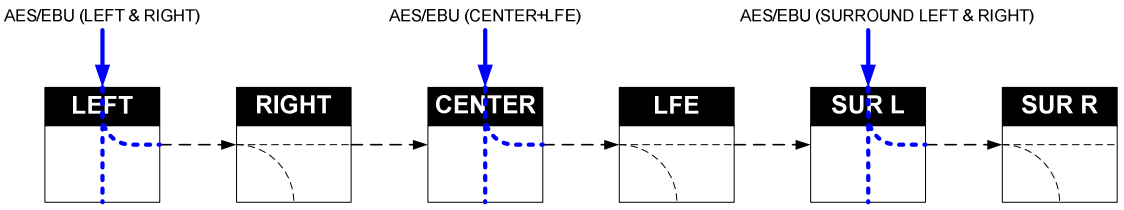
However, for practical reasons and future system maintenance easiness, we do strongly recommend using the FAR Link ™ network, even if no remote control is required.

4.2.3 Multi-channel 5.1 System

A 5.1 digital setup does require 3 AES/EBU cables, each of them carrying 2 audio channels. The channels are usually grouped in Left & Right, Center & LFE and Surround Left & Right. We will assume in the following setups that this is the default channel assignment.

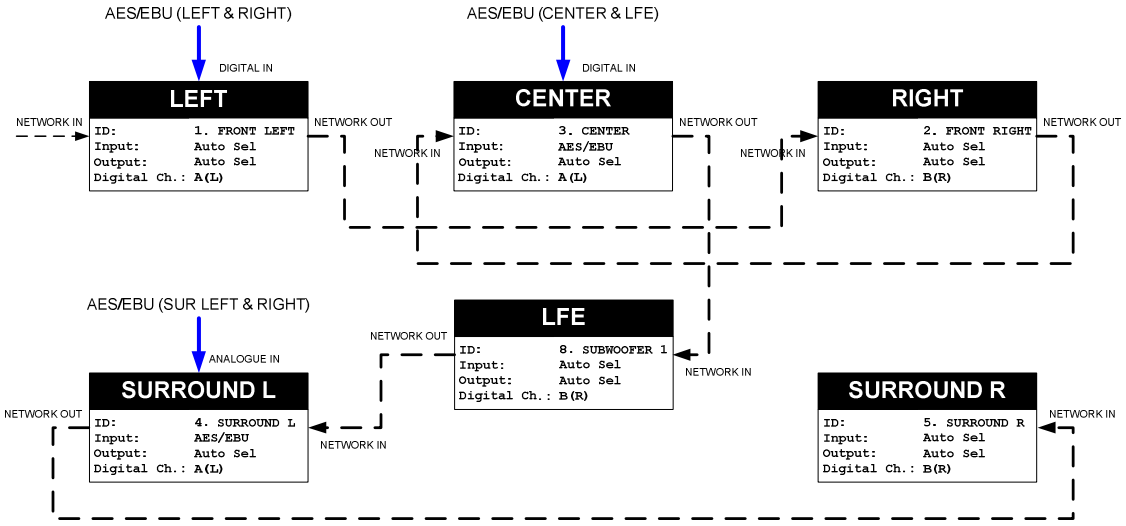
There are multiple ways to connect a 5.1 system. The cabling topology depends a bit on the requirements.

If a minimal number of cables shall be used, the solution is to use the FAR Link ™ network to carry audio and control messages. The audio streams will be sent to the speakers by the mean of 3 XLR cables, connected to the DIGITAL IN connector of the LEFT, CENTER and SURROUND LEFT speakers. As we use the FAR Link ™ to carry the digital audio, the cabling sequence does matter but is not unique. What is important is that the speakers sharing the same IEC60958 stream (AES/EBU) are contiguous, network wise.
The following Figure shows one possible way to easily connect the 6 speakers together. Note that the cabling order of a speaker pair (LEFT & RIGHT, CENTER & LFE or SURROUND LEFT & RIGHT) does not matter, as long as the speaker of the pair that gets the AES/EBU cable is first in the network chain.

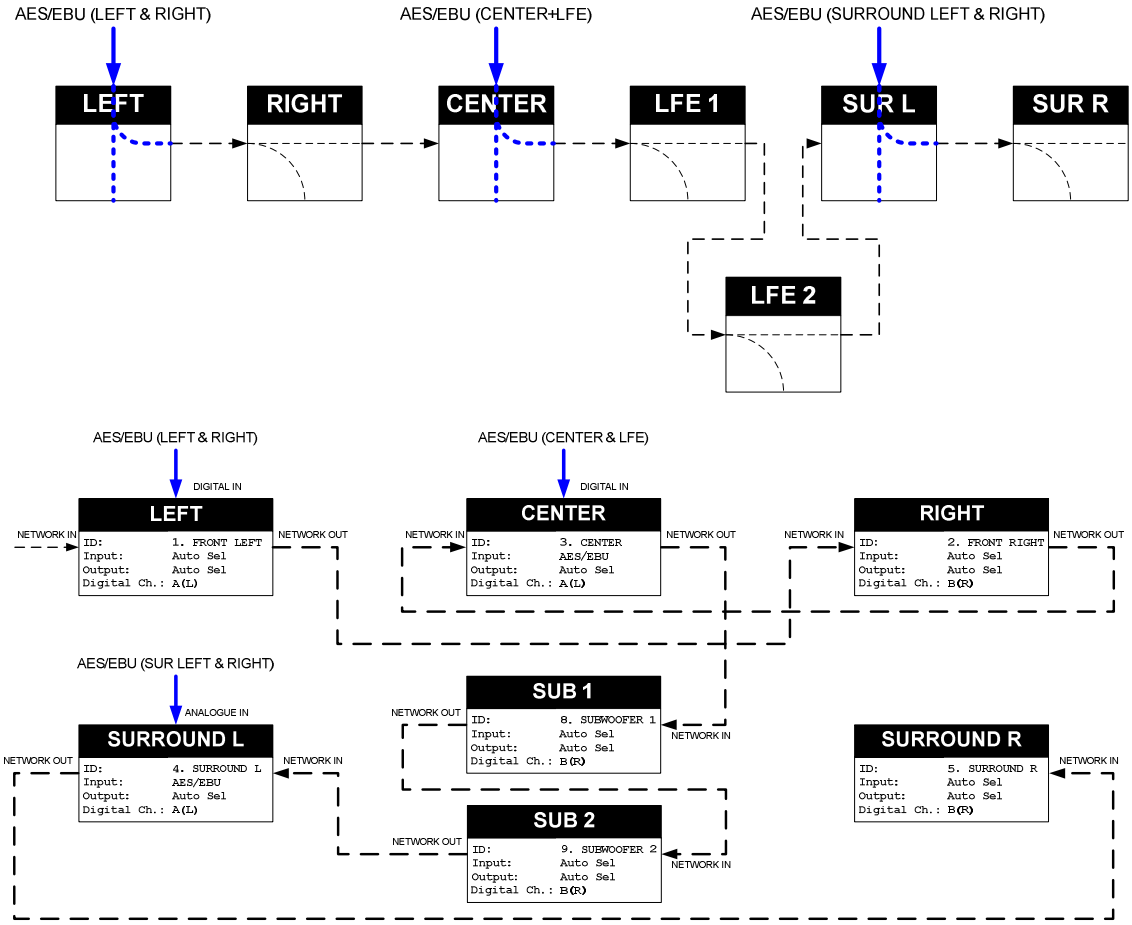


The signal routing is achieved by the mean of the Input and Output speaker parameters.

	LEFT	**RIGHT**	**CENTER**	**LFE**	**SUR L**	**SUR R**
Input	Auto Sel or AES/EBU	Auto Sel or NETwork	AES/EBU	Auto Sel or NETwork	AES/EBU	Auto Sel or NETwork
Output	Auto Sel or AES/EBU	Auto Sel or NETwork	Auto Sel or AES/EBU	Auto Sel or NETwork	Auto Sel or AES/EBU	Auto Sel or NETwork

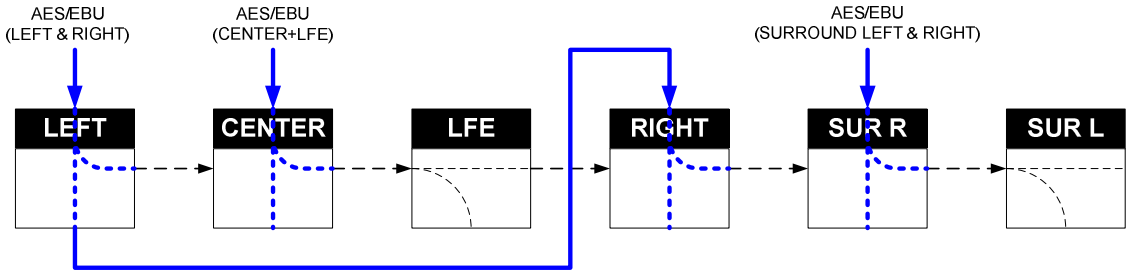


Note: If a second subwoofer for the LFE channel is required, it can simply be inserted right before or after the first subwoofer. The second subwoofer will copy all the settings of the first subwoofer but the spear ID that shall be "**9.SUBWOOFER 2**".



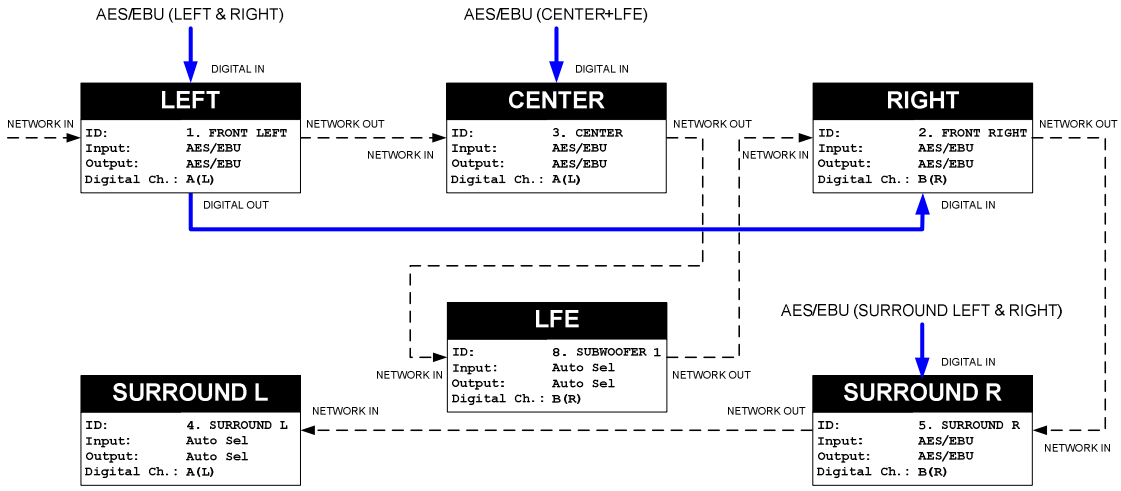
If the proper sequence cannot be respected because the main cabling requirement is to have a speaker linked to its closest neighbor in the room, some speakers will not get the appropriate audio channel through the network. The AES/EBU (LEFT & RIGHT) signal is

fed to the LEFT speaker, which bridges the stream to the FAR Link ™ network. The LEFT speaker network output is connected to the CENTER speaker network input. But the CENTER speaker also has an AES/EBU (CENTER & LFE) cable connected to its DIGITAL IN connector. As only 1 digital stream can go through the network, it is impossible to carry the right channel to the right speaker by using only the network cables. The only way to circumvent the problem is to add an additional link, using an XLR cable between the LEFT and the RIGHT speakers.



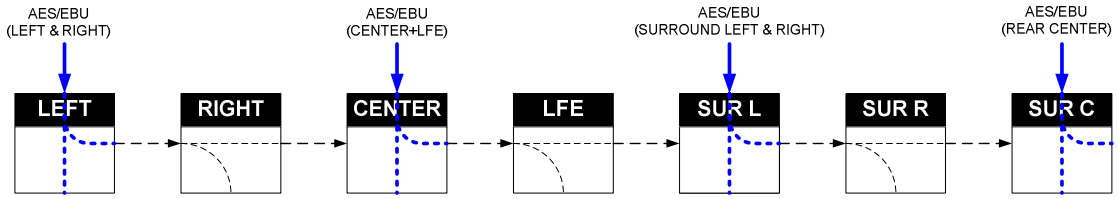
The appropriate setting of the Input and Output speaker parameters will enable this particular signal routing.

	LEFT	**CENTER**	**LFE**	**RIGHT**	**SUR R**	**SUR L**
Input	Auto Sel or AES/EBU	AES/EBU	Auto Sel or NETwork	AES/EBU	AES/EBU	Auto Sel or NETwork
Output	Auto Sel or AES/EBU	Auto Sel or NETwork	Auto Sel	Auto Sel or AES/EBU	Auto Sel or AES/EBU	Auto Sel or NETwork

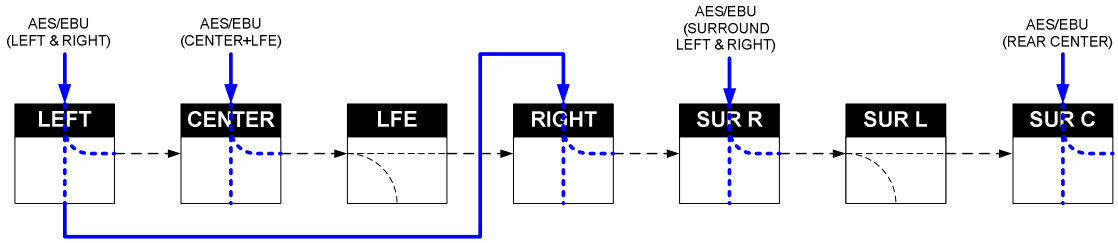


4.2.4 Multi-channel 6.1 System

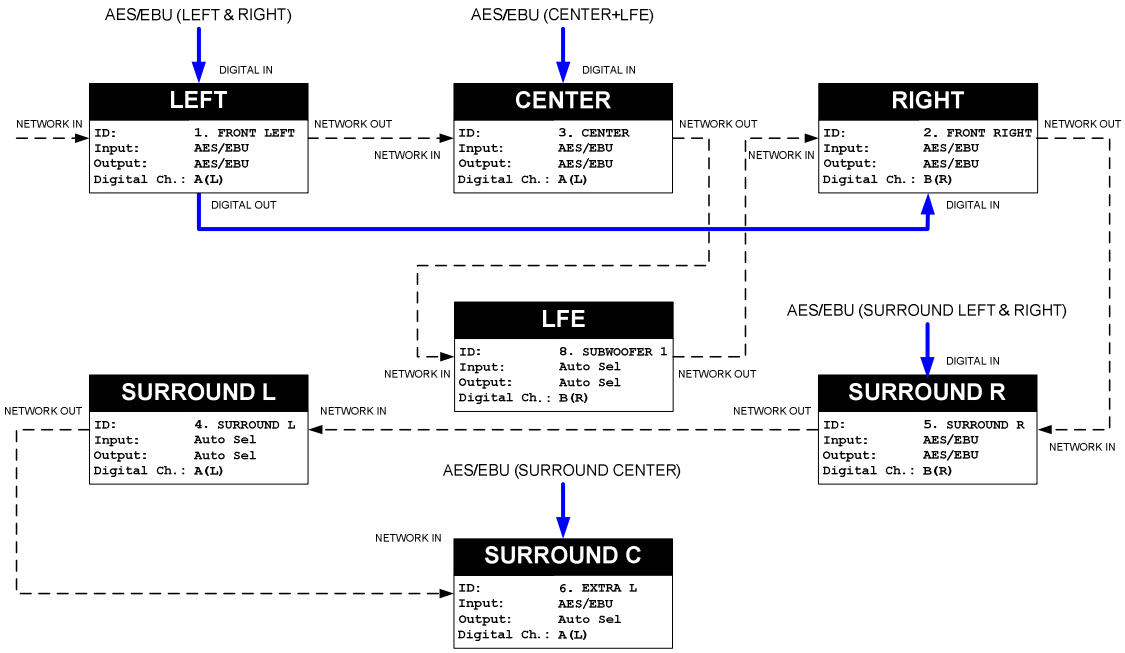
The main difference in a 6.1 system is the addition of a fourth AES/EBU stream, carrying the 7th channel (surround center).
One can opt for the straight cabling approach…



…or may decide to keep the network cables as short as possible (as explained in details in the 5.1 setup description).



The speaker ID of the surround center can either be set to "**6.EXTRA L**" or "**7.EXTRA R**".



5 TECHNICAL SPECIFICATIONS

Model	SUB12.D	SUB15.D
Woofer	12"	15"
Characteristics		
Frequency response (-3dB)	30 Hz – 160Hz	20 Hz - 160Hz
Xover Frequency (LR-4)	40 Hz to160 Hz, step 1 Hz	40 Hz to160 Hz, step 1 Hz
Phase tuning @ Xover freq	0 to 315 deg., step 45 deg.	0 to 315 deg., step 45 deg.
Max Average SPL @ 1m	104 dBSPL	108 dBSPL
Power consumption	< 14W (idle)	< 14W (idle)
Dimension (H x W x D)	500 x 360 x 340 mm	600 x 500 x 350 mm
Weight	22 kg	35 kg
Amplifiers Power (RMS)		
Woofer (@ 1% THD)	200 W	400 W

Common specifications

Analogue input	
Connector	XLR Combo (balanced input)
Input impedance	20 kOhms
Selectable full scale input level	+3, +9, +15, +21, +24 dBu
Resolution	24 bits
Sampling rate	96 kHz
THD+N (@-1dBFS)	<0.0007%
Dynamic range (A - weighted)	111 dB
Digital input 1	
Connector	XLR Combo (balanced input)
Format	AES/EBU (IEC60958)
Input sampling rate	32 kHz to 192 kHz
Digital input 2	
Connector	RJ45 (balanced input)
Format	AES/EBU (IEC60958)
Input sampling rate	32 kHz to 192 kHz
Digital output 1	
Connector	XLR (balanced output)
Format	AES/EBU (IEC60958)
Sampling rate	Input sampling rate or 96 kHz
Digital output 2	
Connector	RJ45 (balanced output)
Format	AES/EBU (IEC60958)
Sampling rate	Input sampling rate or 96 kHz
Digital to Analogue Converter	
Resolution	24 bits
Sampling rate	96 kHz
THD+N (@-1dBFs)	< 0.0008%
SNR (A - weighted)	116 dB
Dynamic range (A - weighted)	116 dB
Linearity (<1dB)	117 dB
Digital signal processor	
Resolution	48 bits
Sampling rate	96 kHz
Processing power	1040 MIPS
Features	

Speaker control	LCD display + 5-way navigator. PC or remote control via the speaker network on RJ45
Preset curves	FLAT, Academy, TV, Car, Club & Custom1 to 3 (all user configurable)
10 band EQ	7 user defined sets
Low shelf	-3 dB to +3 dB
Low tilt	-3 dB to +3 dB
Mid tilt	-3 dB to +3 dB
High tilt	-3 dB to +3 dB
High Shelf	-3 dB to +3 dB
Input signal selection	Manual or auto-select
Selectable delay	0 - 150 cm by step of 5 cm
Room acoustics correction	Yes (optimised externally)